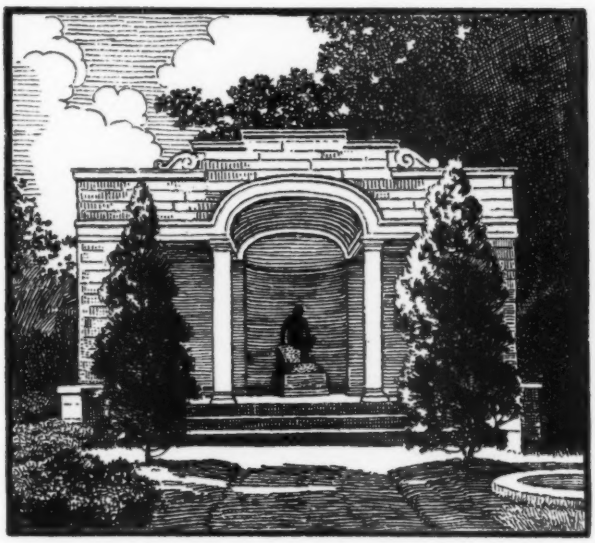
ARBORETUM BULLETIN
OF THE
ASSOCIATES

JANUARY, 1941



THE
MORRIS ARBORETUM
OF THE
UNIVERSITY OF PENNSYLVANIA

Vol. 3, No. 18

Pages 17-35

The Arboretum Bulletin is published quarterly by the Morris Arboretum, Chestnut Hill, Philadelphia, Pa. Application for entry as second-class matter at the Post Office at Burlington, Vermont, is pending. Annual subscription $1.00. Single copies 30 cents. Free to Associates of the Arboretum.

THE

MORRIS ARBORETUM

OF THE

UNIVERSITY OF PENNSYLVANIA

Pyramidal Norway Spruce
Picea Abies pyramidata (Carr) Rehd.

ARBORETUM BULLETIN — VOL. 3, NO. 18, JANUARY, 1941

DR. RODNEY HOWARD TRUE
1866 - 1940

In Memoriam

DR. RODNEY HOWARD TRUE—1866-1940

On April 8, 1940, Dr. Rodney H. True, first and late Director of the Morris Arboretum, died at the age of 73. In failing health for some months, he retired from the directorship on November 1, 1939, though continuing to live at his Arboretum home until his death.

Dr. True's scientific achievements—and they are many and distinguished—are a matter of record. Moreover, summaries of these have already appeared in the scientific press and others are to follow. Therefore, it is perhaps more appropriate and fitting here to dwell upon those qualities and attributes which motivated his life and which gave direction and strong purpose to his fruitful activities—of which the scientific was only one of many.

If we were to attempt to epitomize in a word the essential qualities of Dr. True's character, we probably would agree that they sum up to a striking unworldliness. Uninterested in his personal material fortune, generous to a fault (little do we know of his generosity because bestowed so quietly and unobtrusively), indifferent to considerations of position and fame, social and otherwise, Dr. True had his life and being in the intellectual, artistic, and spiritual realms. They pervaded his every interest and effort. At heart an artist and a poet, he had a passionate love for and discriminating appreciation of art, music, and literature, especially poetry. He was a stout defender of what he considered to be right, irrespective of the possible consequences to himself. What he perceived as injustices, social or otherwise, stirred him deeply.

And throughout there ran an interest in and a devotion to matters of the intellect that persisted tenaciously to the very end. Mine was the rare privilege of witnessing this, realizing that under far less trying conditions most of us would have found our intellectual powers dulled and rendered impotent under the impact of physical suffering. In him mind was indeed master of the body.

One of Dr. True's many interests was history, and especially history of agriculture. In late years this interest turned to Thomas Jefferson, partly through a fortunate circumstance, though I suspect that the character of Jefferson was itself a lodestone to one constituted as was Dr. True.

The Jefferson Garden Book came to light in the library of the Massachusetts Historical Society. In Jefferson's own handwriting throughout, it reflects the amazingly diverse and deep methodical interest in horticulture and agriculture on the part of this intellectual giant. This book Dr. True deciphered where necessary, completing the final correction of the transcription only a short while before his death.

But this was only a beginning. Starting from the prosaic, day-by-day entries in the Garden Book, Dr. True, through discerning and discriminating historical research, connected some of these, notably those on rice and grapes, with deep social and humanitarian concerns, thus illuminating an important new facet of the apparently endless interests of Jefferson. Fortunately, thanks to Dr. True's intellectual tenacity, the essentials of several of the most significant of these findings were got on paper during the closing weeks of his life. These cannot be anticipated here, but it is hoped that their publication will not be long delayed.

It is not too much to say, for it reflects the judgment of competent historians, that Dr. True's was indeed a genuinely historical sense. His career might equally well have been, and indeed was in part, that of a discerning historian, who not merely records but interprets against a comprehensive background.

It is a matter of deep regret that Dr. True's profound knowledge of the history of agriculture could not have been preserved for posterity in book form. Responsibilities and preoccupations in other directions prevented this. There are excellent specialists in various aspects of the history of agriculture. But I doubt that there is anyone in America whose knowledge is so comprehensive from ancient times to the present. Dr. True knew the history of agriculture from the point of view of the art and the technique. But more than this, he knew it in its contemporary economic, social, and political settings, giving him an integrated grasp of the subject rarely achieved.

Dr. True's was indeed a many-sided and intensely intellectual life. His brilliant mind, his prodigious knowledge, his devotion and service to the Arboretum, and, above all, his friendly presence, will long be missed.

J. R. S.

SPRUCES

ANY PRETENSE at a planting of evergreens, however simple or elaborate, might very appropriately include specimens of Spruce, whether they be grown as isolated plants, or as forming part of a group of plants. The clean-cut triangular outline and pyramidal form of a single specimen may exhibit perfection of symmetry unsurpassed by other evergreens. Variations in color of foliage from dark green to bluish green, from golden yellow to yellow green in varietal forms, make them objects of contrast and delight the year round, and especially so when other vegetation seems lifeless and brown. Through their slow but sure development they build up ornamental characters which may abide for many years. Their habit and foliage characters are enhanced by the appearance of red or yellow staminate (male) cones and green, brown, or purple ovulate (female) cones at certain seasons of the year.

Although spruces possess definite foliage and cone characters which distinguish them from Firs, the two groups are often confused and still treated by some as one. The genus *Picea,* the Spruce, is readily distinguished from the genus *Abies,* the Fir, by the short stalk (sterigma) which supports the leaf. When the leaf drops, the stalk persists as a woody peg-like projection which gives the twig a rough surface. The leaf of *Abies* disarticulates flush with the twig surface, leaving a round scar and a comparatively smooth twig surface. This is a simple means of separating Spruces from Firs when dealing with leafless twigs or branches, but leafy twigs lend themselves also to simple means of identification. Whether the twig surface will become smooth or rough with the shedding of the leaves, can be determined by locating the position of the leaf-articulation or joint at which defoliation occurs. In detached twigs of Spruce, the leaves drop with the drying out of the twig. The *form* of the leaves, although not conclusive evidence in all cases, is a further aid in separating Spruces from Firs. In the former they are decidedly angled in cross section while in the latter they are mostly flat and relatively broad. Flat-leaved forms of *Picea* are sometimes confused with the genus *Tsuga,* the Hemlock, but the Hemlock leaf is narrowed abruptly at the base into a short definite stalk (petiole) in contrast to the Spruce.

As to cone characters, the female cones of *Picea* are usually pendulous from the branches and do not fall apart when mature, being shed as complete cones. In *Abies* the cones are usually upright on the topmost branches and shatter when reaching maturity.

Picea includes about forty species widely distributed throughout the northern hemisphere from the Arctic Circle to high mountains of warm-temperate regions, some species forming great forests. Seven of these species are native to North America, some of which deserve special mention as important forest trees. *Picea mariana,* the Black Spruce, reaches its maximum development in the boreal region of North America where it covers large areas and attains its largest size. *Picea rubens,* the Red Spruce, often forms a large part of extensive forests in eastern North America and extends southward on the slopes of the Allegheny Mountains to Tennessee. *Picea glauca,* the White Spruce, ranges from Labrador to Alaska and south to Montana, Minnesota, and New York. One form, *Picea glauca* var. *albertiana* Sarg., is common in valleys of the Black Hills of South Dakota and the Rocky Mountains of northern Wyoming, Montana, and northward. *Picea Engelmanni,* the Engelmann Spruce, is distinctly a western species, often forming great forests from Alberta, Alaska, and British Columbia southward to New Mexico and Arizona. It attains its best development in the region north of the United States. Other western species are *pungens,* the Blue Spruce, and *sitchensis,* the Sitka Spruce.

Exclusive of its Nursery, the Morris Arboretum contains a collection of more than forty specimens of Spruce, representing at least twelve species, some with a number of varietal forms. This affords more than usual opportunities to visitors and students who wish to observe and study a fair representation of Spruces in a single collection. Attention may be drawn to some of them.

Picea pungens, the Colorado Blue Spruce, with its variously colored foliage of silvery white, bluish white, golden yellow, bluish green, blue, and green, might be regarded as one of the popular species grown for medium-sized plants. Its form alone makes it an outstanding figure in any landscape. The variety *Kosteriana* (*P. pungens glauca pendula* Beiss.), the Weeping Blue Spruce, with its bluish-white foliage and pendulous branches always attracts attention, except when good symmetry is desired. A specimen may be seen halfway between the Swan Pond and the Lodge. A handsome specimen of variety *argentea,* with its silvery-white foliage, is located near the Main Gate. A larger specimen is near the lower drive. The variety *argentea,* synonymous with *Kosteri* or *Kosteriana* of the trade, preserves its pyramidal form with increasing age better than most other varieties, but all forms of *P. pungens* unfortunately tend, as they grow older, to shed their lower branches.

Picea polita, the Tigertail Spruce, is quite distinct from other Spruce species in its rigid, spiny-pointed, dark-green lustrous leaves, which are spreading and

radially arranged, sometimes curved. The dark-brown winter buds are very conspicuous, with their scales persisting for a long time as a blackish sheath, thus setting off successive seasonal growths very sharply. Color variation of the branches is very noticeable from the last growth traced backward four to five years. A grasp of a twig is quite convincing of the rigid spiny character of the leaves. This species should make a good hedge plant. Several specimens are located in different parts of the Arboretum: by the Nursery, the Cloverleaf Fountain in the southwest corner of the Arboretum, and a fine specimen near the Lodge. Of the rarer species, this is one of the most popular for decorative garden work. *Picea polita* is an introduction from Japan.

Picea orientalis, the Oriental Spruce, from the Caucasus, may be recognized by its short (less than one-half inch long) dark-green crowded leaves. It is valued as an ornamental for its shining leaves and graceful habit. Several varieties are in cultivation. North of the main entrance drive is a specimen with drooping lower branches which are attached to the main stem six to eight feet from the ground, but with their extremities touching the ground. The lower branches may persist for many years. Another tree is located on the hillside south of the Mansion.

Picea Abies, the Norway Spruce, is native to Europe. It was introduced into this country many years ago and is now grown extensively as an ornamental, being regarded as one of the most popular species. Close to fifty garden forms have been named on the basis of color variation, columnar or pyramidal habit, pendulous branches, and low-growing dense types. From ten to twelve forms are distributed throughout the Arboretum. Var. *pyramidata,* by the Cloverleaf Fountain, is a good example of pyramidal form. (See Frontispiece.) The lower branches are long, close to the ground, and densely clothed with branchlets and leaves. Var. *Maxwellii,* in the Japanese Garden, is an unusually dense, low form with numerous short impenetrable branchlets bearing finely pointed leaves. To ascertain the age of the plant would be puzzling. Nearby is another dwarf form, var. *pumila.*

Picea omorika, the Serbian Spruce, is a hardy species with compressed leaves which closely resemble those of the Fir. Each leaf has two white bands on the upper side. A handsome tree is located in the Cloverleaf Fountain group of evergreens.

Picea Engelmanni, the Engelmann Spruce, a very desirable ornamental tree, is represented by two small specimens: one north of the Mansion and the other near the Lodge Gate.

Four small trees of *Picea asperata* are located on the west side of the Nursery and a medium-sized tree at the corner of the Rose Garden. *P. asperata* is an introduction from China, where it becomes tall and valuable as a timber tree.

Picea Maximowiczii, the Japanese Bush Spruce, distinguished by its short, spreading leaves and resinous buds, has little value as an ornamental and is not very common in cultivation.

This short treatment of Spruces does not give a comprehensive picture of all the specimens in the Arboretum, as less than half have been considered. In a collection of evergreens where different genera and species are in miscellaneous groups, individuals are often overlooked. The citations above aim to point out more or less definite locations of a small number of them, to emphasize characteristics by which some may be recognized, and to give some idea of the wide geographical sources represented in the collection.

If the Nursery collection were included, additional species and forms would double the number.

Irwin Boeshore,
Department of Botany,
University of Pennsylvania.

FEDERAL FOREST RESEARCH IN PENNSYLVANIA

THE OBJECT of the investigations carried on in Pennsylvania and the adjacent States by the Allegheny Forest Experiment Station* is the same as that of foresters' activities everywhere—to make our forests fully useful to Man.

Pennsylvania once led all the States in the production of lumber. No finer white pine ever grew anywhere than in parts of the Allegheny mountains, and our hardwoods have been shipped to every State in the Union. Only recently white oak from Chester County was used in the great bridge across the Golden Gate at San Francisco. The State still produces a little lumber, and very considerable quantities of other wood products: cross ties, piling, mine timbers, pulpwood, veneer, and so-called chemical wood.

A few years ago the Allegheny Station made some rough calculations of the amount of wood its territory—Delaware, Maryland, and New Jersey, in addition

* Maintained by the United States Department of Agriculture at Philadelphia, in cooperation with the University of Pennsylvania.

to Pennsylvania—might produce if our more than 20,000,000 acres of forest land were managed as intensively as the forests of the Old World. Assuming no increase in wood consumption by these wealthy, highly-industrialized States, we estimated that we could produce the greater part of the softwoods we need, and a considerable surplus of hardwoods. I personally look forward to the day when the United States will list wood in many forms among its major exports. But not until we have put our forest house in order!

Pennsylvania's forests do vastly more for Man, however, than supply us with wood. Although foresters are, unfortunately, not yet able to express in concrete terms the beneficial influence which a good forest exerts on the flow of streams, we are confident that there is no better watershed cover than such a forest. Prevention of erosion, and equalization of streamflow throughout the year, are of enormous importance in a territory which includes such rivers as the Delaware, Susquehanna, and Allegheny. Our 16,000,000 people use these streams intensively for water supply, navigation, generation of power, recreation, and commercial fisheries; we are cursed by their destructive power in floods, which in 1936 caused us about $200,000,000 worth of damage.

But perhaps the greatest service our forests render to Man is spiritual. Recreation in the broadest sense is to be had for the asking in Penn's Woods. Hunting, fishing, camping, picnicking, tramping, and sheer enjoyment of natural beauty, add immeasurably to our health and sanity in these nerve-wracking days. "With arms outstretched the Druid wood waits with its benedicite," and in ever-increasing numbers Americans today seek this benedicite.

If the aim of the forester is to make the forest fully serve mankind, it is clear that our forest research should deal with both biology and economics. Because the average person is probably more interested in biology than economics, I shall describe the Station's economic researches only by title, as it were. For the last 2½ years, in close collaboration with other bureaus of the U. S. Department of Agriculture, and the Army Engineers, we have been making flood control surveys. These appraise the damages done by floods in this territory, and recommend such improvements in watershed vegetation, both agricultural and natural, as we believe will at least pay for themselves. Just last year we received an appropriation for a survey of forest employment opportunities in the anthracite coal region of Pennsylvania. This survey should reveal how much emergency labor is needed to rebuild the greatly depleted forests of the coal region, and how many jobs might be created by permanent forest industries based on the restored resource.

The Station's biological researches necessarily deal with forests rather than with trees. The forester's concern is the *natural vegetation* growing on thousands and millions of acres. Unlike the farmer, who this year has alfalfa growing in a certain field, next year corn, and a third year wheat, the forester can control only to a limited extent the kinds of trees growing on these huge acreages. Even in Pennsylvania, where many forests have been established by artificial planting, an overwhelming percentage of forest land is covered by the tree species which Nature, not Man, selected for the purpose. If Man finds some of these species less useful than others, he can theoretically use his axe and saw more heavily against them than against the more useful species. Practically, however, he does just the opposite. The lumberman cuts the useful species, which are the only ones he can sell, and leaves the others in possession of the ground.

Some of the earliest and most fundamental research of the Station has been directed toward finding out what tree species Nature favors under our conditions of soil and climate, and why she favors them. In other words, in all reverence I may say that we are trying to find out "which way the Almighty is going, in order that we may get things out of His way." We have made intensive studies of the tiny remnants of our virgin forests—now amounting to less than 1/10 of 1 per cent of the total forested area—in order to determine the requirements for growth of the different tree species, and their behavior in relation to each other. This information we will apply to the second- and third-growth forests, in order that in our efforts to increase the proportion of useful species we may work *with* natural forces, instead of against them. It would be inexcusable arrogance to do otherwise.

The virgin forests we have studied are on the Allegheny Plateau of northwestern Pennsylvania. Here grew the white pine which was the glory of the Pennsylvania lumber industry, following the Civil War. We feel that we have abundantly proved, as others before us have suspected, that on the comparatively heavy (unglaciated) soils of this region white pine maintained its place among the hemlocks, beech, sugar maple, and yellow birch only as a result of catastrophes. These catastrophes were apparently very heavy local winds, amounting sometimes to hurricanes, and forest fires, set by lightning or Indians. Evidence of windfall, consisting of humps and adjacent hollows where large quantities of soil clung to the massive roots of felled trees and were gradually washed off, we have found to endure for well over a century. Charcoal in the soil is an even more enduring proof of past fires. The areas visited by such catastrophes were generally small, but sometimes ran up to a few hundred acres. The nearly total absence of shade, and

the exposure of mineral soil wherever the "duff," or surface mat of fallen leaves and débris, was burned away, evidently favored white pine seedlings and discouraged the hemlock and hardwood seedlings. White pine seed is light and winged, and seed-bearing trees were vastly more common in the virgin forest than in our present-day forest. The stricken areas, therefore, often came up naturally to a dense growth of white pine.

As the white pine is a rapid grower, and in crowded stands casts heavy shade, almost pure forests of this species dotted the primeval landscape. Our research shows that these exist for only one generation, however. At perhaps 200 years they begin to thin out, and beneath them comes up an understory of shade-enduring species, the hemlocks and certain hardwoods. Gradually the pines mature and die. Although they seed abundantly, none of their progeny can stand the conditions immediately beneath them. With just one exception, where high winds struck twice in one spot at an interval of about 125 years, no natural white pine stand of which we know has been followed by another pine stand. The inference is to us plain. If we want white pine in our future Allegheny Plateau forests, we must simulate the soil and shade conditions which favored its ancestors. We must create sizeable openings when mature timber is cut, and perhaps we should burn the logging débris, under proper safeguards. We must of course be assured of an abundant pine seedfall, or plant the area artificially. Similarly, in recently-logged areas where white pine seedlings have managed to get a start we must give them some help against the hardwoods.

Another rather fundamental investigation has given us a reasonable explanation of the absence of second-growth forests from certain locations in the Allegheny Plateau. These are depressions along shallow stream courses, which stumps of the virgin timber show to have been forested once, but which have remained bare following logging, although the surrounding territory has long since reforested naturally. Maximum and minimum thermometers read for several years in one such location in our Kane Experimental Forest, Elk County, Pennsylvania, show that this is a frost pocket, and that in the spring months when newly-germinated tree seedlings are frost-tender, the nights are 6° or 8° F. colder than at an adjacent station having better air drainage. Moreover—and this phenomenon we have never explained to our satisfaction—the day temperatures are correspondingly higher. In short, in such situations the tiny trees must withstand a daily temperature range greater by 12° to 15° than in surrounding lands. It will take a long time before these frost pockets reforest naturally. Obviously, they

should never have been heavily logged, for other climatic studies we have made show that a forest cover ameliorates extremes of temperature.

Perhaps the greater part of our biological studies deal with the practical, every-day problems of the forester. Among these is timber stand improvement, familiarly known as TSI to many of the CCC boys. The object of TSI work is to improve the growing conditions for the relatively small number of trees in a young forest that will have room to mature. Nature, particularly in our beech-birch-maple forests, is prodigal of life. Out of 10,000 seedlings and sprouts that may be growing on an acre of 10-year-old woods, less than 200 can survive to sawlog size. The rest will die in the next 75 years. Unless the forester salvages them, they will fall to the ground, and rot. How many should be cut today for the benefit of a selected few, and how often it will pay to weed or thin the stand as it grows, we have endeavored to find out in sample areas. A small sample will not do, because in a forest composed of eight or ten species the variety of mixtures is enormous. Methods to be followed in a stand largely of sugar maple will not do in one dominated by black cherry and ash. We have today in our Kane Experimental Forest some thirty acres of young stands, experimentally weeded or thinned.

Space forbids telling of a number of other lines of biological investigation we have under way in Pennsylvania. It can only be said that in studying our trees we have not overlooked such enemies of the forest as fires, disease, and destructive insects. We have been particularly interested in the effect of wildlife—birds and animals—on the forest, and of varying forest conditions on wildlife. After all, the forest is a complex of living things. If, in order to survive, we have arrogated to ourselves the right to make the forest serve us, we must never forget that our powers are limited. In order to have power, we must have understanding. I hope that all lovers of trees and forest will sympathize with, and will support, our efforts at understanding Penn's Woods.

R. D. Forbes,
Allegheny Forest Experiment Station.

THE PRUNING OF TREES

THE IMPORTANCE of pruning shade and ornamental trees has been recognized since the beginnings of arboriculture many centuries ago. The views relative to the various phases of pruning, even including its advisability, are of wide diver-

sity. Hence, many tree owners and individuals who are concerned with the care of trees may be in doubt sometimes as to when and how a given species of tree should be pruned.

Trees are the most conspicuous of all plants. They are commonplace things. Yet a beautiful tree, or a group of them, appeals to the best in the souls of most men. Biologically, our understanding of them is scanty as contrasted with that of the majority of our economic plants. The lack of understanding of the life habits

FIG. 1

FIG. 2

Fig. 1. Showing, on left of trunk, the stub of a branch of a Norway maple tree, which was pruned off about 1932. Note break on underside of the stub due to improper pruning methods.—Fig. 2. Unsightly pruning stubs on a hard pine, *Pinus* sp. The workman does not understand how to prune.

of trees and their enemies explains, to a very large degree, the differences of opinion relative to pruning and other phases of arboriculture. The pruning of trees is often looked upon as plain ordinary manual labor. Thus, as a rule, it becomes the work of individuals who have no scientific background and to whom a tree is just so much wood. Figures 1, 2 and 3 illustrate the kind of pruning that is so often done by men who, though conscientious, do not understand the nature of a tree, its scientific and aesthetic value. This kind of work results in more harm than good. Pruning cuts of this type, especially in our broad-leaved trees, become favored places for the entrance of wood-destroying fungi and insects, which in time greatly disfigure and ultimately cut short the life of the tree. The

FIG. 3 FIG. 4

Fig. 3. A branch-removal wound made by a workman who does not understand pruning.—Fig. 4. An ugly canker on a hackberry tree which had its origin from an untreated and neglected pruning wound.

pruning of trees is not merely a matter of sawing wood, but should be considered an art based upon the results of scientific research on the physiology, habits of growth, the relation to the biology, and other factors of the tree's environment.

The question may often be asked: Why should shade and ornamental trees be pruned since natural pruning takes place in the forest? We have all seen the boles or trunks of trees without the slightest trace of a branch for a distance of twenty-five feet or more above ground. An examination of the center of the bole of one of these trees will reveal the traces of branches which were pruned off early in the life of the tree. Owing to the shade from competing trees, the leaves on these branches could not function in the manufacture of carbohydrates, which are so essential to the well-being of the trees. Consequently, the branches died, shortly decayed, and dropped off, and their broken ends were soon callused over.

Shade and ornamental trees grow more or less out in the open. Consequently, the leaves on their branches, except in the inner region of the crown, do not become shaded out so early nor so readily as in the forest. Thus, the branches attain a much greater diameter than in the case of the forest tree before their leaves cease to function. The greater the diameter of the dead branch, the less readily it

will decay and fall off. When this happens, an ugly stub may remain on the tree. The part of the tree which supports this stub grows out over it, but complete callusing may require many years, depending upon the size of this remnant of the branch and the rate of growth of the tree. Meanwhile, the dead wood has decayed, often leaving a hole which may become only partially filled with the occluding callus. The collection of water in such openings is highly favorable to the entrance and development of wood-destroying fungi in the tree. Even where the dead and decayed wood of the stub remains intact, such organisms readily find their way into the tree. Thus, the most obvious reason for pruning shade and ornamental trees is to get rid of the diseased and dead branches, because when they are not removed bark-killing and wood-destroying fungi eventually gain entrance into other parts of the tree where they continue their work of destruction. Insects are one of the most common carriers of the spores (seeds) of fungi. Insects which inhabit diseased and dead parts of the tree carry the spores of fungi which are inimical to the tree: for example, the European elm bark beetle is the chief carrier of the deadly Dutch elm disease. Pruning, therefore, is a very necessary phase of tree sanitation.

It is sometimes necessary to remove living branches, especially where there is chafing or rubbing. Street trees require the pruning of live branches for the sake of shapely development and to prevent interference with traffic. In this connection, it should be remembered that, whenever possible, pruning should be done in the dormant season. Callusing of the wounds will begin more quickly in our broad-leaved trees when pruned just before or soon after growth begins. Also, where a number of living branches are to be pruned off, it is important that the operation should extend over a period of at least two or three years, or until the desired form of the crown has been attained.

The final phase in the removal of branches from a tree consists in protecting the wounds with an antiseptic dressing to prevent drying out as much as possible and the entrance of wood-destroying fungi and insects. The subject of proper dressings for wounds in trees is still unsettled. When not thoroughly treated and kept completely coated with a good antiseptic until callused over, wood-destroying fungi almost invariably enter the wound and sooner or later cause destruction in the bole of the tree. Figures 4, 5 and 6 illustrate what happens so frequently when pruning or other wounds on trees are not treated with a good antiseptic and properly cared for until completely callused or healed over. Too frequently when wounds are covered with an antiseptic dressing at the time of the removal of the

branch, they receive little, if any, further attention. Such wounds usually crack open later, thus making it all the more possible for the entrance of destructive fungi and insects. The wound shown in Figure 5 was treated with an antiseptic soon after the branch was removed, but received no further attention.

It is important to bear in mind the fact that all of our shade and ornamental trees are growing in artificial environments where there is, as a rule, a deficiency of mineral and other food materials. They have all come directly or indirectly from the forest. The writer has found that the trees in many artificially established forests, while apparently vigorous, are not so highly resistant to destructive fungi and insects as are trees which have developed where the seeds have fallen. Since this is true, may we not expect at least as great, if not greater, susceptibility to attack from these organisms in our shade and ornamental trees as in individuals of similar species under natural forest conditions? Wounds on our shade and ornamental trees cannot be expected to heal so readily as if these same individuals were under good natural forest conditions. The fact that our shade and ornamental trees are in artificial environments does increase the hazards of disease and other injuries and the necessity for judicious pruning as well as the proper care of their wounds. If there are sufficient water and nutrient materials in the ground, other factors being equal, the necessity for pruning will be reduced to a minimum. Wounds in vigorous trees will heal much more rapidly when properly protected than in an impoverished tree.

The inadequacy of our present knowledge of pruning, as well as other phases of arboriculture, is due in a large degree to practically a total lack of carefully prepared case records, which must necessarily be kept over a long period of years. Until this is done, the pruning of trees will remain a matter of wide controversy and opinion. There is abundant literature on the methods of pruning of shade trees, but there is little to be found on the actual results achieved. With ample case records, the pruning of our shade and ornamental trees will become established on a far more sound scientific basis than is true at the present time. The securing, keeping, and interpreting of these data is a problem for individuals who are trained and experienced in how a tree lives, the requirements, habits of growth, and its environmental relationship.

In Philadelphia and its environs is a wide variety of trees which are of foreign origin. The vast majority of these trees are on estates, many of which are among the very finest in America. The men who are entrusted with the care of these estates are confronted with a great many questions relative to the pruning of exotic trees as well as of our own native species.

FIG. 5 FIG. 6

Fig. 5. A neglected wound of four years' standing on a tulip poplar tree, showing the fruiting bodies of a wood destroying fungus, *Polyporous gilvus*. The cut was properly made and a good callus is forming.—Fig. 6. An old pruning wound on a paper mulberry tree, showing the fruiting bodies of a common wood destroying fungus, *Pleurotus ostreatus*. This wound was never treated.

Some of the problems in this connection are: What is the best time of year for pruning? No one season will apply equally well to all of the various species and varieties of trees. Where and how should the cuts be made? What kinds of tools should be employed? How should the wounds be treated? What kind of treatment, if any, should a pruned tree receive? What will be the rate of callusing of the wounds on each species of tree? The rate of callusing on the individuals of a species?

Many of our shade-tree ailments have their origin in unscientific pruning and care of tree wounds. The perfection of our present methods of pruning and other phases of arboriculture, whereby trees may be made to live longer and to retain their beauty and symmetry of form, can be realized only by scientific research on trees. A discussion of methods of pruning will follow in a later issue.

Harlan H. York,
Department of Botany,
University of Pennsylvania.

CURATORSHIP OF THE ARBORETUM

AN ARBORETUM, quite as much as a collection of paintings displayed in an edifice, constitutes essentially a museum, albeit an outdoor one. And generically at least, the problems presented by the two are not unlike. Among these are discriminating selection, determination of authenticity or identity, pleasing and artistic arrangement, skillful maintenance, protection against deterioration and possible abuse, fostering the enjoyment and educational benefits derived by the public from the collections, and the like. It is therefore appropriate that there has been established the Curatorship of the Morris Aboretum, carrying responsibilities similar to those associated with this long-recognized office in museums.

To fill this newly created position, the Arboretum has secured the services of Mr. Henry T. Skinner, who entered upon his duties in July of last year. A graduate of the Royal Horticultural School at Wisley, England, Mr. Skinner was for two years at the Arnold Arboretum in Boston, going from there to Cornell University. At the latter he has for some years been on the staff of the Department of Floriculture and Ornamental Horticulture in the New York State College of Agriculture, receiving in 1937 the degree of Master of Science in horticulture.

ACKNOWLEDGMENTS

THE ARBORETUM is grateful for the following presentations:

Ambler Nurseries,
Ambler, Pa.
7 plants of Pieris and Quercus.

Andorra Nurseries,
Chestnut Hill, Philadelphia, Pa.
54 plants of Ginkgo and Ilex.

Arthur Hoyt Scott Foundation,
Swarthmore, Pa.
76 plants of Salix.

Boyce Thompson Arboretum,
Yonkers, N. Y.
10 plants of Cornus, Halesia, Malus and Ulmus.

Cornell University,
Ithaca, N. Y.
1565 plants of Arbutus, Azalea, Chamaecyparis, Juniperus, Rhododendron and Tsuga.

Henry A. Dreer, Inc.,
Riverton, N. J.
20 plants of Buddleia and Tamarix.

Eastern Shore Nursery,
Maryland.
3 plants of Nandina.

James I. George & Son,
Fairport, N. Y.
22 plants of Hybrid Clematis.

Huntington College,
Huntington, Ind.
2 plants of Fraxinus.

Morton Arboretum,
Lisle, Ill.
10 plants of Quercus.

Native Gardens,
Spokane, Wash.
3 plants of Pachistima.

Park Valley Nurseries,
Prospectville, Pa.
8 plants of Chamaecyparis.

Rose Manufacturing Company,
Philadelphia, Pa.
A supply of Triogen for use on roses.

Maurice Bower Saul,
Moylan, Pa.
3 plants of Cryptomeria and Magnolia.

Wharton Sinkler,
Elkins Park, Pa.
42 plants of Hybrid Brassocattleya, Cattleya and Laeliocattleya.

U. S. Department of Agriculture,
Bureau of Plant Industry,
Washington, D. C.
20 plants of Abelia, Abies, Betula, Lonicera, Philadelphus and Picea.

Soil Conservation Service,
Washington, D. C.
141 plants of Albizzia, Paliurus, Taxodium and Ulmus.

OPEN HOURS AT THE ARBORETUM

INAUGURATING a new policy on May 11, 1940, the Arboretum has since that date been opened to the public daily, including Sunday, from 9:00 A.M. until sunset. It will henceforth be closed only for the two holidays of Christmas and New Year's Day. Entrance for visitors is by way of the Main Gate on Meadowbrook Lane and the South Gate at Germantown and Hillcrest Avenues. The latter is readily accessible by bus from the Chestnut Hill bus and trolley terminal.

This extension of visiting hours has been reflected in a greatly increased public attendance throughout the past season, particularly during the Sundays and evenings of those periods when the grounds are perhaps at their best, in early summer and again for the foliage display of fall.

COVER DESIGN

THE COVER design represents the Mercury Temple at the end of the South Lawn. It is a pen rendering made, together with the frontispiece photograph, by Gustave Liebscher.